Chapter 3
Impact of Generic Fluid Milk and Dairy Advertising and Promotion on Dairy Markets: An Independent Analysis

The Dairy Production and Stabilization Act of 1983 (Dairy Act; 7 U.S.C. 4514) and the Fluid Milk Promotion Act of 1990 (Fluid Milk Act; 7 U.S.C. 6407) require a yearly independent analysis of the effectiveness of milk industry programs. These promotion programs operate to increase milk awareness and thus the sale of fluid milk and related dairy products. From 1984 through 1994, USDA was responsible for the independent evaluation of the National Dairy Promotion and Research Program (Dairy Program), as authorized by the Dairy Act, and issued an annual Report to Congress on the effectiveness of the Dairy Program.

Beginning in 1995, the Congressional report began including third party analyses of the effectiveness of the Dairy Program in conjunction with the National Fluid Milk Processor Promotion Program (Fluid Milk Program) authorized by the Fluid Milk Act. Since 1988, these independent analyses have been conducted by agricultural economists from Cornell University.

Unlike last year's review, this analysis does not include an economic evaluation of solely generic advertising of fluid milk and cheese. Advertising alone is no longer evaluated because such advertising, and particularly advertising sponsored by dairy producers, has been declining in importance in recent years. Instead, the economic evaluation focuses on the combined generic marketing activities. The results of two separate models are presented.

The first model is a fluid milk-only demand model used to evaluate the economic impacts of all generic fluid milk marketing activities of both programs on fluid milk demand. The generic fluid milk marketing activities include fluid milk advertising and non-advertising marketing activities used to increase demand, including public relations, sales promotions, nutrition education, and sponsorships. While the dairy producer and fluid milk processor programs utilize various types of marketing strategies to increase fluid milk consumption, the effects of fluid milk marketing under both programs are combined because the objectives of both programs are the same and data cannot be satisfactorily segregated to evaluate the two programs separately.

The second model is a total dairy demand model for all fluid milk and dairy products used to evaluate the economic impacts of all generic marketing activities for those products. The total dairy demand model is included because the dairy producer programs now emphasize an "all dairy" promotion strategy (3-A-Day™) over product-specific campaigns.

Similar to the first model, marketing activities in the second include generic advertising, sales promotions, public relations, nutrition education, and sponsorships. Unlike the first model, the marketing activities in the second model include activities for all dairy products (fluid milk and manufactured dairy products). This model provides a measure of the economic impact of all demand-enhancing, generic marketing activities by both programs.

Highlights

Generic fluid milk marketing activities sponsored by fluid milk processors and dairy producers have helped mitigate a long-term decline in per capita fluid milk consumption in the United States. Cornell estimates that these marketing efforts have had a positive and statistically significant impact on per capita fluid milk consumption. Specifically, over the period 1995 through 2004, it is estimated that a 1.0 percent increase in generic fluid milk marketing expenditures resulted in a 0.056 percent increase in per capita fluid milk consumption when holding all other demand factors constant.

What about the impact on total consumption of fluid milk? From 2000 through 2004, generic fluid milk marketing activities increased fluid milk commercial disappearance by 26.9 billion pounds in total or 5.4 billion pounds per year. Alternatively stated, had there not been generic fluid milk marketing conducted by the two national programs, fluid milk consumption would have been 9.7 percent less over this time period. Hence, the combined efforts of the two programs to market fluid milk have had a positive and statistically significant impact on fluid milk consumption.

Regarding total dairy product demand, the average generic dairy marketing program elasticity for the period 1990–2004 was 0.078; i.e., a 1.0 percent increase in expenditures for these marketing activities increased per capita dairy demand by 0.078 percent. Thus, the total marketing program effort had a positive and statistically significant impact on dairy consumption.

The benefit-cost ratio (BCR) for the Dairy Program for the period 2000 through 2004 was calculated. The benefits of the Dairy Program were calculated as the change in dairy farmers' net revenue due to demand enhancement from all marketing activities under the Dairy Program. The costs of the Dairy Program were calculated as the difference in total assessment revenues before and after the national program was enacted. The results show that the average BCR for the Dairy Program was 5.11. This means that each dollar invested in generic dairy marketing by dairy producers returned $5.11, on average, in net revenue to farmers.

To make allowances for the error inherent in any statistical estimation, a 90 percent confidence interval was calculated for the average BCR. The confidence interval provides a lower and an upper limit for the average BCR. One can be "confident" that the true average BCR lies within these bounds 90 percent of the time. The estimated lower and upper bounds for the average BCR were 4.19 and 6.02, respectively. This confidence interval demonstrates that one could be confident that 90 percent of the time the true average BCR lies between a low of 4.19 and a high of 6.02. Hence, it is reasonable to conclude that the benefits of the Dairy Program's marketing activities have been considerably greater than the cost of the program.

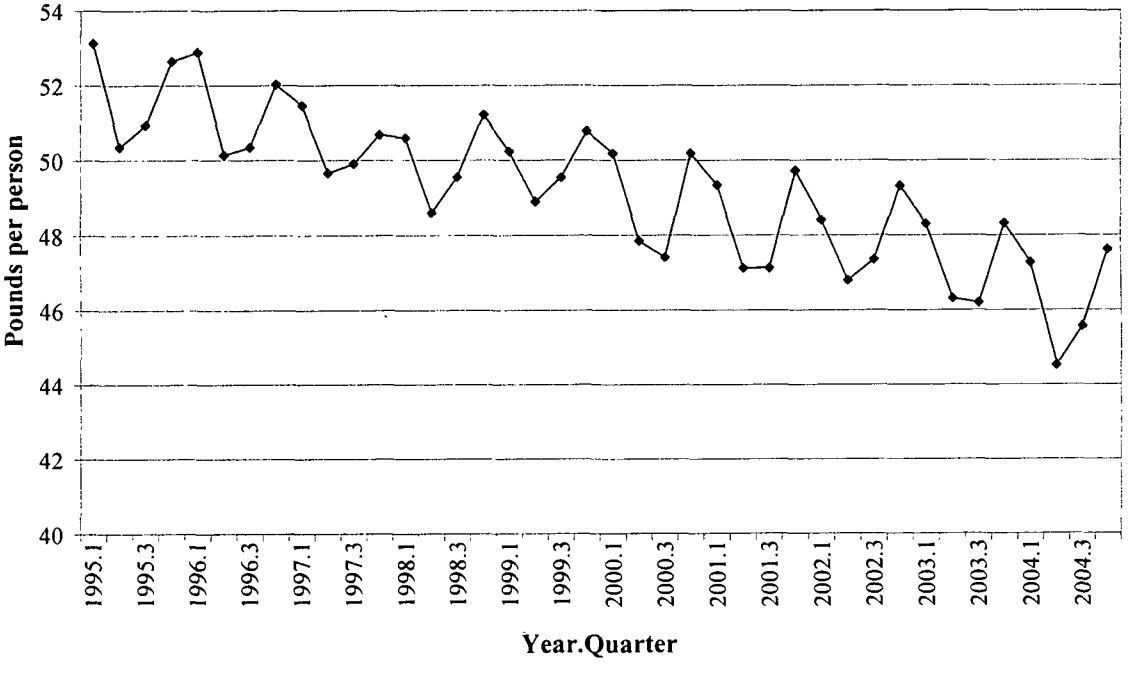
Analysis of Generic Fluid Milk Marketing

Per capita fluid milk consumption in the United States has been trending downward for many years. Among the factors behind this decline are aggressive advertising and marketing by producers of beverages that compete with fluid milk, changes in U.S. population demographics, changes in consumer preferences for fluid milk, and how and where people consume food. As the model described in this report uses quarterly data covering the period 1995 through 2004, the following is a brief graphical overview of changes in per capita fluid milk consumption and factors hypothesized to affect milk consumption over this time period. It is important to emphasize, however, that the decline in per capita fluid milk consumption has occurred over a significantly longer period of time than since 1995.

Figure 3–1 illustrates the steady decline in fluid milk commercial disappearance since 1995 (along with seasonal and quarterly changes). From 1995 to 2004, per capita commercial disappearance declined by almost 11 percent. This translates into an average annual rate of decline of a little more than 1.0 percent annually.

One potential cause of declining per capita fluid milk consumption may be the positive trend in food consumed away from home. As people consume relatively more food away from home, fluid milk consumption may be diminished by the lack of availability of many varieties of fluid milk products at the nation's eateries as well as the expanding availability of fluid milk substitutes. Many eating establishments carry only one type of milk product, which causes some people who would normally drink milk to consume a different beverage if their preferred milk

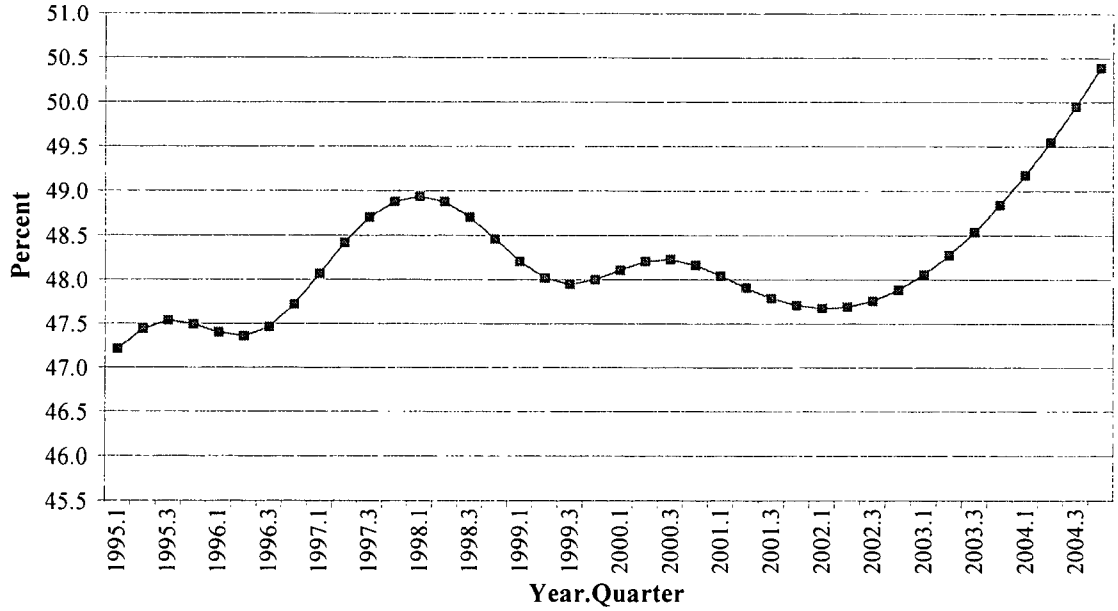
Figure 3–1. Per Capita Fluid Milk Consumption



product is not available. Figure 3–2 illustrates the trend in expenditures on food consumed away from home as a percentage of total food expenditures since 1995. Between 1995 and 2004, the annual average percentage of expenditures on food consumed away from home increased by 4.9 percent. While there were some ups and downs in the percentage of food consumed away from home over this period, the general trend is increasing from 1995 to 2004. It is evident from Figures 3–1 and 3–2 that fluid milk consumption and eating away from home are negatively related. Thus the increase in food consumed away from home has likely been responsible for some of the decrease in per capita fluid milk consumption.

Another potential reason why per capita fluid milk consumption has declined may be changes in population demographics. One important change is the declining proportion of young children in the population since 1995 (the decline has leveled out since 2000). Since young children are one of the largest milk-consuming cohorts, any decline in that cohort negatively impacts per capita fluid milk consumption. Figure 3–3 shows the percentage of the population that was less than six years old from 1995 to 2004, a segment of the population that has decreased by more than 8 percent since 1995.[1] Therefore, there is a positive correlation between per capita milk consumption and this age cohort—both are declining.[2]

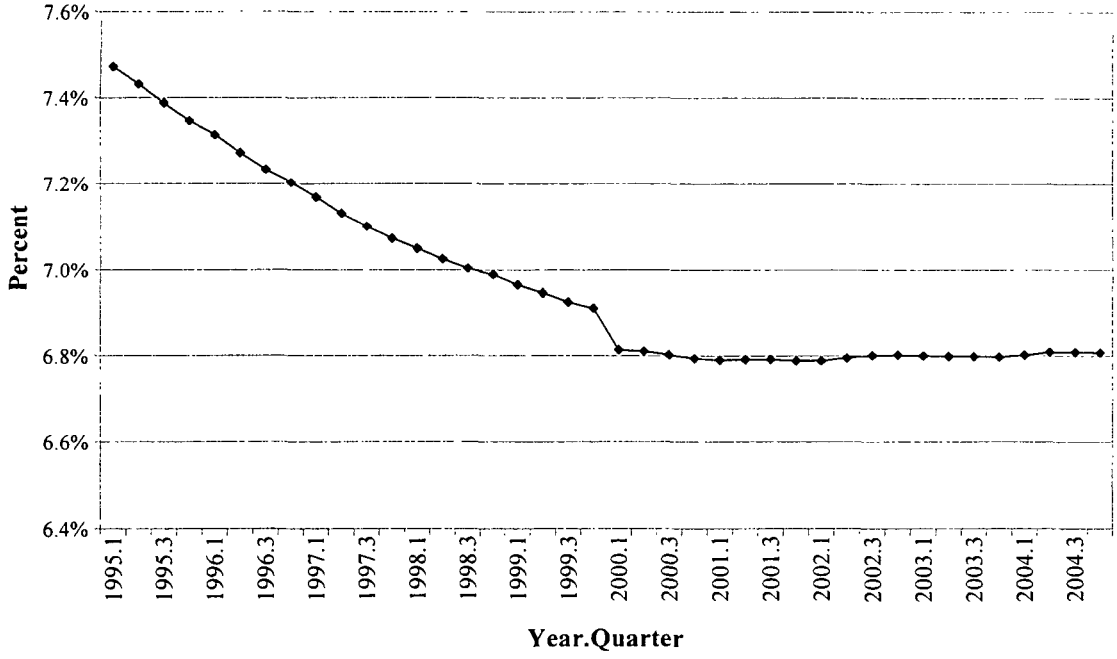
Figure 3–2. Expenditures on Food Consumed Away From Home as a Percentage of Total Food Expenditures



[1] The downward jump in the percentage of the population under six years of age that occurred between 1999 and 2000 as indicated in the 2002 census data.

[2] Since 2000, the positive relationship between per capita fluid milk consumption and the percent of the population under six years old has weakened considerably with the flattening out of the age demographic variable. However, this positive relationship nevertheless holds for the period 1995 through 2004.

Figure 3–3. Percentage of U.S. Population Under Six Years of Age



Since 1995, the retail price of fluid milk products has been rising relative to other nonalcoholic beverages. This pattern is displayed in Figure 3–4. Note that any value above 1.0 means the consumer price index for fluid milk is higher than the consumer price index for nonalcoholic beverages. While there have been some periods since 1995 where retail fluid milk prices declined relative to other beverage prices, two-out-of-three periods have been characterized by rising relative retail prices for fluid milk. From 1995 through 2004, annual average fluid milk prices rose 31 percent relative to other beverages. These retail fluid milk price increases may be responsible for some of the decline in per capita fluid milk consumption.

Fluid milk's loss of market share to other beverages also may be due to aggressive marketing by competing beverage producers. Indeed, both dairy producers and fluid milk processors started generic marketing programs to combat competing marketing from other beverage producers. Since 1995, the one beverage that has grown the most in per capita consumption is bottled water, due in part to increased advertising and promotion by bottled water firms. Figure 3–5 displays real (inflation-adjusted) per capita advertising expenditures for bottled water. This advertising increased from practically nothing in 1995 to a high of 4.5 cents per person per quarter in 2002 (with consistently higher spending in the second and third quarters of the year). While this is still relatively small compared to advertising by other competitors such as soft drink firms, advertising of bottled water has increased substantially since 1995.

Figure 3–4. Retail Price of Fluid Milk Relative to Other Beverage Prices

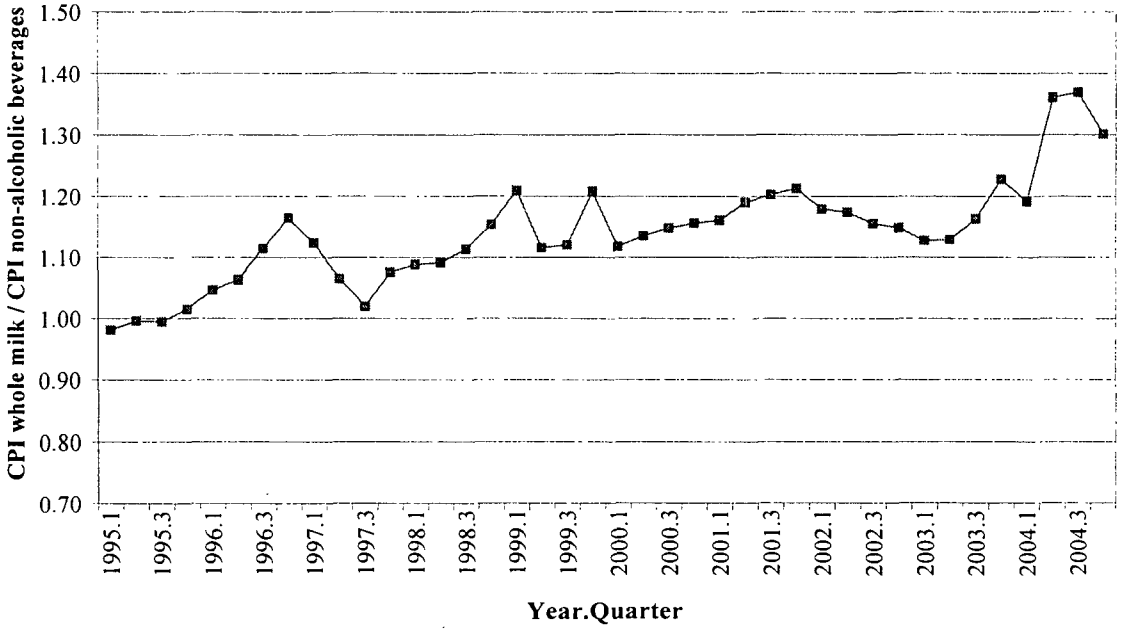
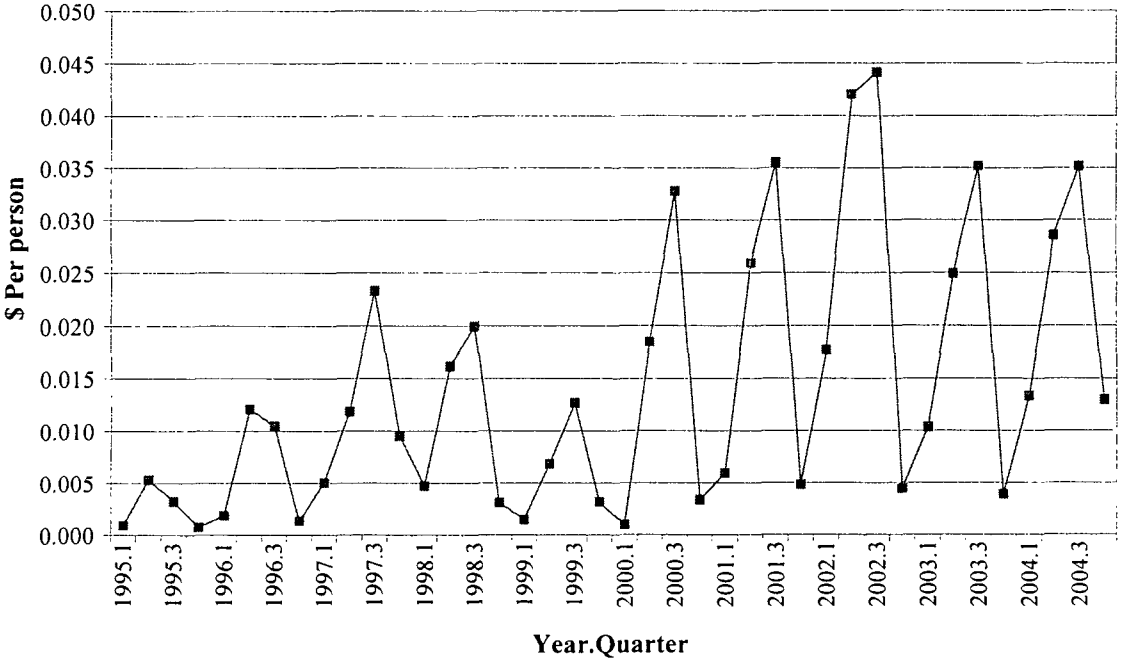


Figure 3–5. Real Per Capita Bottled Water Advertising



One factor that may have mitigated some of the long-term decline in per capita fluid milk consumption is the growth in real income over this period. Fluid milk is considered to be a "normal" good, which means that consumption increases as consumers' disposable incomes increase. Figure 3–6 illustrates the steady positive trend in real per capita income (in 2004 dollars) from 1995 to 2004. Since 1995, per capita income has increased by 28.6 percent.

Another factor that may have mitigated some of the long-term decline in per capita fluid milk consumption over this time period is the generic marketing sponsored by fluid milk processors and dairy producers. The dairy-producer checkoff program is the largest checkoff program in the United States in terms of revenue and the fluid milk processor program is the second largest. Figure 3–7 shows the combined real expenditures (in 2004 dollars) on generic fluid milk marketing efforts by these two programs. From 1995 to 1998, there was steady growth in real expenditures for generic fluid milk marketing, from just under $34 million in the first quarter of 1995 to $80 million in the fourth quarter of 1998. Since 1998, however, such expenditures have been declining. Combined annual average real expenditures declined by 13.5 percent from 1995–2004. This decline may have diminished somewhat the impact of the generic marketing programs on the long-term decline in per capita fluid milk consumption.

To more formally evaluate the relationship between per capita fluid milk consumption and factors hypothesized to influence that consumption, an econometric modeling approach was developed. Because there are factors other than generic advertising that influence the demand for fluid milk, this model was used to identify the effects of individual factors affecting demand. The following variables were included as factors influencing per capita fluid milk demand: the consumer price index (CPI) for fluid milk; the CPI for nonalcoholic beverages, which was used

Figure 3–6. Real Per Capita Disposable Income

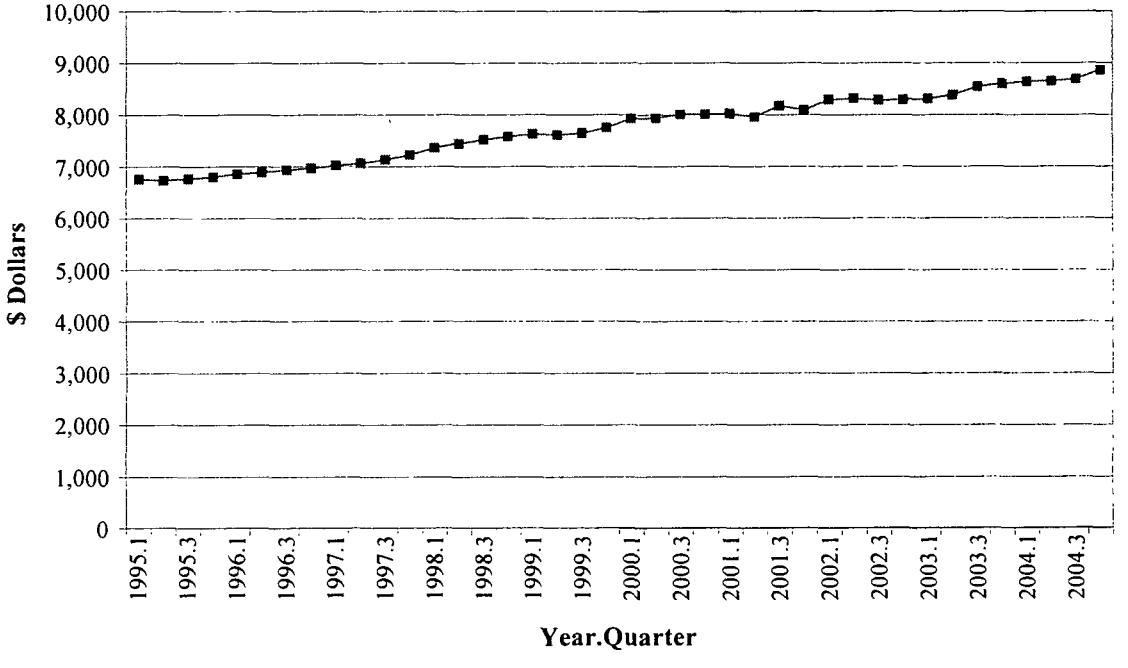
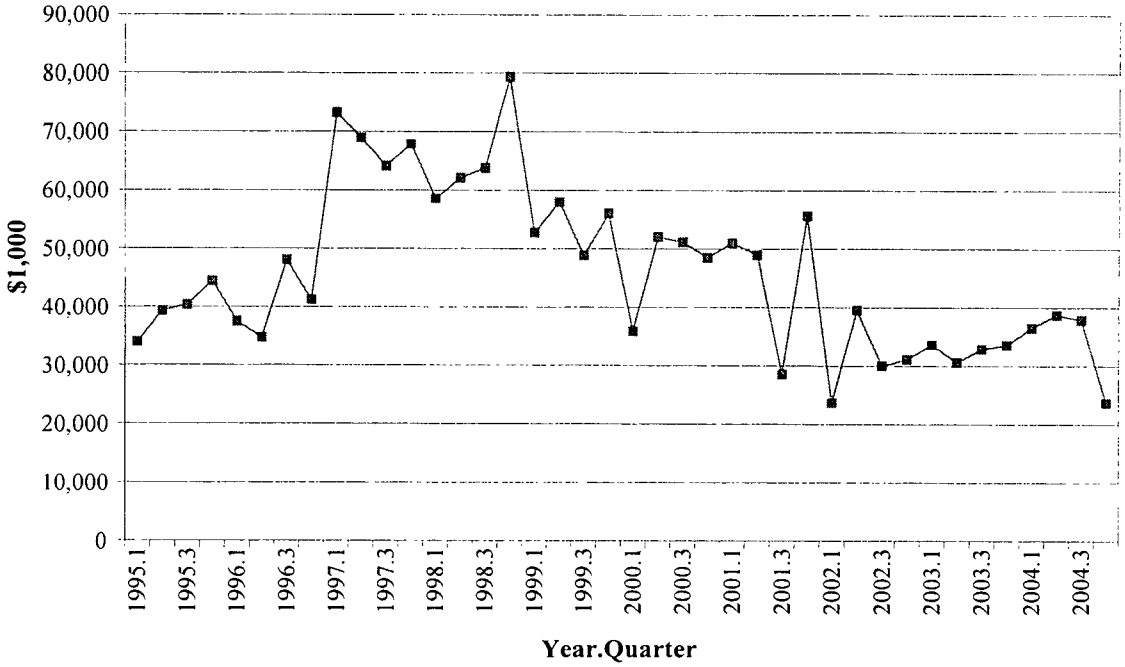


Figure 3–7. Real Generic Fluid Milk Marketing Expenditures



as a price proxy for fluid milk substitutes; the percentage of the U.S. population less than six years old; per capita disposable income; variables to capture seasonality in fluid milk demand; expenditures on food consumed away from home as a percentage of total food expenditures; per capita expenditures on bottled water advertising; and expenditures on generic fluid milk marketing. As mentioned in the introduction, the marketing expenditures included funds spent on fluid milk advertising, public relations, sales promotions, nutrition education, and sponsorships. Since the goals of the two marketing programs are the same, all generic milk marketing activities by both programs were aggregated into a single generic marketing variable.

The model was estimated using national quarterly data from 1995 to 2004. To account for the effects of inflation, all prices and income were deflated by the appropriate consumer price index. Generic fluid milk marketing and bottled water advertising expenditures were deflated by a media cost index computed from annual changes in promotion and advertising costs by media type supplied by Dairy Management Inc. Because marketing has a carry-over effect on demand, past fluid milk marketing expenditures also were included in the model as explanatory variables using a distributed-lag structure.[3] Similar procedures were used to capture this carry-over effect for bottled water advertising.

[3] Specifically, a second-degree polynomial lag structure with both end point restrictions was imposed. The demand model included current expenditures and seven quarters of lagged real generic milk marketing expenditures to capture the carry-over effect of the marketing activities. The length of lag used here was a little longer than used in previous studies, which indicates that such demand enhancing activities as the *got milk?*® and milk mustache campaigns have long-lasting effects on consumers.

The relative impacts of variables affecting demand can be represented by "elasticities." An elasticity measures the percentage change in per capita demand given a 1.0 percent change in one of the identified demand factors while holding all other factors constant. Table 3–1 provides average elasticities for the period 1995 through 2004 for variables found to have a statistically significant effect on consumption.[4] For example, a price elasticity of demand for fluid milk equal to –0.148 means that a 1.0 percent increase in the real (inflation-adjusted) retail fluid milk price decreases per capita fluid milk quantity demanded by 0.148 percent.

The most important factors influencing per capita fluid milk demand are the percentage of the population under 6 years of age and the proportion of food expenditures on food eaten away from home. While not as large in magnitude, retail fluid milk prices, income, expenditures on generic fluid milk marketing efforts, and bottled water advertising expenditures also significantly impacted per capita fluid milk demand.

Population demographic changes had an impact on fluid milk consumption. Specifically, the percentage of the population under 6 years of age had an estimated elasticity of 1.212. This means that a 1.0 percent increase in this age cohort would result in a 1.212 percent increase in per capita fluid milk demand when holding all other demand factors constant. This result is consistent with previous studies (including last year's analysis), which show that one of the largest milk-consuming segments of the population is young children.

Another important fluid milk demand factor is the amount of food that is consumed away from home, which was measured in this model as real expenditures on food eaten away from home

Table 3–1. Average Elasticity Values (1995–2004) for Factors Affecting the Retail Demand for Fluid Milk[1]

Demand Factor	Elasticity
Retail price	–0.148*
Per capita income	0.154*
Percent of food-away-from-home expenditures	–0.610*
Percent of population younger than six years of age	1.212*
Bottled-water advertising	–0.014*
Generic milk marketing	0.056*

[1] Example: A 1.0 percent increase in the retail price of fluid milk is estimated to reduce per capita sales of fluid milk by 0.148 percent. For more information on the data used, see Table 3–3. *Statistically significant at the 1.0 percent significance level or less.

[4] The estimated model fit the data extremely well. All variables were statistically significant at the 1.0 percent significance level. The adjusted goodness-of-fit measure indicated that the explanatory variables explained 96 percent of the variation in per capita fluid milk consumption. Various statistical diagnostics were performed and no statistical problems were found.

as a percentage of total expenditures on food. The estimated elasticity for this factor was –0.610. A 1.0 percent increase in the percentage of food consumed away from home expenditures would result in a 0.610 percent decrease in fluid milk demand. As mentioned previously, this negative relationship may be due to the limited availability of fluid milk products and high availability of fluid milk substitutes at many eating establishments, which frequently offer only one or two types of milk beverages. One can hypothesize that because of these limited choices, some people who would ordinarily choose milk select another beverage instead. This result suggests the need to target the retail food service industry in an effort to increase away from home consumption. Efforts to increase the variety of fluid milk beverages offered to customers may increase the competitiveness of fluid milk.

Not surprisingly, the retail price of fluid milk has a negative and statistically significant impact on per capita demand. The results indicate that a 1.0 percent increase in the real retail price of fluid milk would result in a 0.148 percent decrease in per capita fluid milk quantity demanded. The magnitude of this elasticity is relatively small, which indicates that U.S. consumers' milk purchasing behavior is insensitive relative to changes in the retail price. This result, which is consistent with the other studies, is likely due to the fact that fluid milk is generally regarded as a staple commodity in the United States. However, as described in the previous section, the retail price of milk has increased substantially since 1995 (31 percent) relative to the price of other beverages. Consequently, the increase in fluid milk price has contributed to the decline in per capita consumption.

Per capita disposable income had a positive and statistically significant impact on per capita fluid milk consumption. A 1.0 percent increase in real per capita income would result in a 0.154 percent increase in per capita fluid milk demand, holding all other demand factors constant.

The generic fluid milk marketing activities sponsored by dairy producers and fluid milk processors have had a positive and statistically significant impact on per capita fluid milk demand. The average marketing elasticity was computed to be 0.056 and was statistically significantly different from zero at the 1.0 percent significance level. Thus, a 1.0 percent increase in generic fluid milk marketing would increase per capita fluid milk consumption by 0.056 percent holding all other demand factors constant. This generic marketing elasticity is larger than estimated last year for just generic fluid milk advertising (0.037). However, the model and length of time series data used for the two analyses also are different. Hence, the two elasticities are not comparable.

Finally, bottled water advertising has had a negative impact on fluid milk demand during the study period. The estimated fluid milk demand elasticity with respect to bottled water advertising was –0.014. While relatively small in magnitude, this elasticity was statistically different from zero at the 1.0 percent significance level.

To examine the impacts on total consumption of fluid milk for the period from 2000 through 2004, the economic model simulated the estimated demand equation for two scenarios: (1) a baseline scenario, in which the combined fluid milk marketing expenditures were equal to actual marketing expenditures under the two programs and (2) a no-national-Dairy-Program, no-Fluid

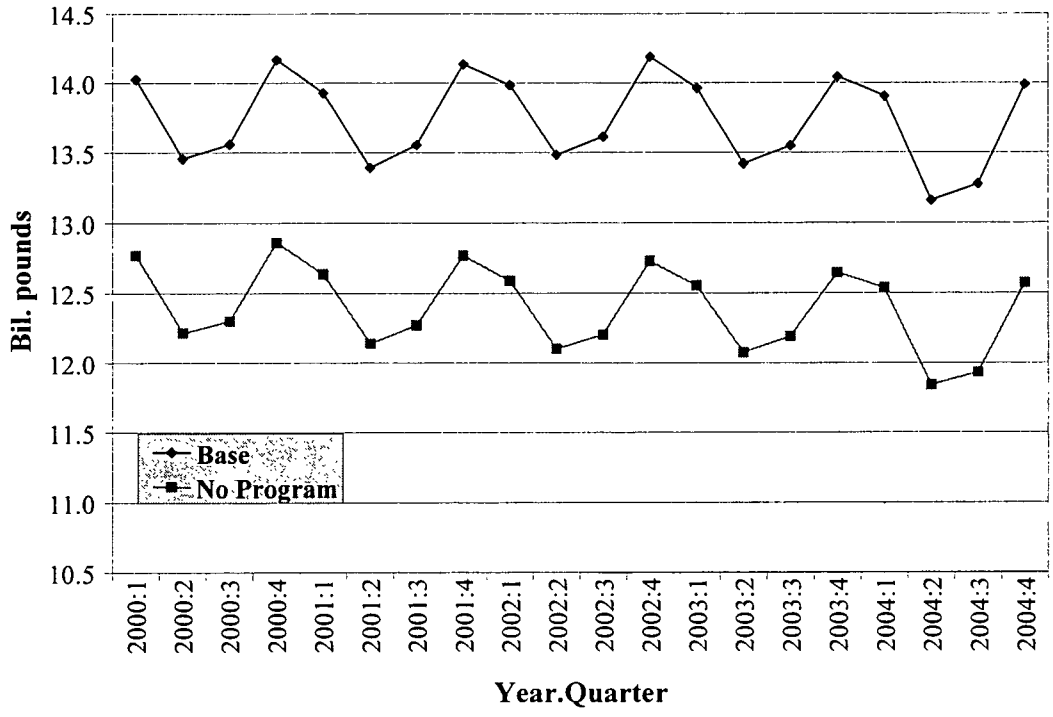
Milk-Program scenario in which there was no fluid milk-processor-sponsored marketing and dairy-producer-sponsored fluid milk marketing was reduced to 42 percent of actual levels to reflect the difference in assessment before the national program was enacted. A comparison of these scenarios provides a measure of the impact of the two national programs.

Figure 3–8 displays the simulation results for quarterly fluid milk commercial disappearance for the two scenarios. It clearly shows the positive impact on total fluid milk consumption due to the milk-processor and dairy-producer marketing programs. From 2000 through 2004, these marketing activities increased fluid milk commercial disappearance by 26.9 billion pounds in total, which is 5.4 billion pounds per year. Put differently, had there not been generic fluid milk marketing conducted by the two national programs, fluid milk consumption would have been 9.7 percent less than it actually was over this time period. Hence, the bottom line is that the fluid milk marketing efforts by dairy farmers and fluid milk processors combined have had a positive and statistically significant impact on fluid milk consumption.

Analysis of Total Dairy Product Generic Marketing

To examine the overall impact of the dairy producer and fluid milk processor programs on overall dairy demand, a combined fluid milk/dairy product demand model was developed that included all demand-enhancing marketing activities as one of the demand determinants. Per capita commercial disappearance of fluid milk, cheese, butter, and frozen products was used to

Figure 3–8. Simulated Base and No-National Fluid Milk and Dairy Programs



represent total dairy demand.[5] Expenditures for the following marketing activities were aggregated into one variable to reflect their combined impact on total dairy demand: total dairy-producer expenditures for generic milk and cheese advertising, public relations, sponsorships, retail promotions, and nutrition education and total fluid milk processor expenditures for generic milk advertising, public relations, and promotions.[6] In addition, the following variables were included as factors influencing per capita dairy demand: the CPI for all dairy products, per capita disposable income, variables to capture seasonality in dairy product demand, and per capita expenditures on consumption of food away from home.

The model was estimated with national quarterly data for 1990–2004.[7] To account for the impact of inflation, all monetary variables were deflated by the CPI for all items. Generic fluid milk and cheese marketing expenditures were deflated by a weighted average media cost index (television, radio, print, and outdoor) for fluid milk and cheese.

Table 3–2 provides selected elasticities from the total dairy demand model. All demand elasticities were statistically significantly different from zero at the 1.0 percent significance level. The most important factor in the model impacting per capita disappearance of all dairy products was expenditures on food consumed away from home as a percentage of the total expenditures on food. The results indicate that a 1.0 percent increase in the percentage of food-away-from-home expenditures would result in a 0.921 percent increase in combined per capita total dairy demand. The average retail price elasticity for 1990 through 2004 was –0.583; in other words, a

Table 3–2. Average Elasticity Values (1990–2004) for Factors Affecting Total Dairy Retail Demand

Demand Factor	Elasticity
Retail price	–0.583*
Per capita income	0.264*
Percent of food-away-from-home expenditures	0.921*
Generic dairy marketing	0.078*

*Statistically significant at the 1 percent level or less.

[5] Since all products were expressed on a milk-fat equivalent basis, non-fat dry milk is not included. The summation of fluid milk, cheese, butter, and frozen dairy products, on a milk fat equivalent basis, is used as a measure of total dairy demand.

[6] Considerably more than 90 percent of the combined generic marketing budgets of dairy farmers and fluid milk processors is spent on fluid milk and cheese marketing activities. Hence, expenditures on fluid milk and cheese marketing are used as a measure of the overall dairy marketing efforts of the two programs.

[7] Unlike the fluid milk demand model, data for the total dairy demand model went farther back in time to 1990. We could not go back prior to 1995 for the fluid milk model because it was impossible to separate fluid milk marketing expenditures from total dairy marketing expenditures before 1995. Since extra data existed for the total dairy demand model, they were used.

1.0 increase in the retail price of dairy products would result in a 0.583 percent decrease in per capita quantity demanded for all dairy products. Income was also an important factor in the total demand model. The estimated income elasticity was 0.264, indicating that these dairy products are normal goods; that is, consumption rises with increases in income.

The major interest here is the combined advertising and promotion or "marketing" elasticity. The average marketing elasticity for this period was 0.078; a 1 percent increase in expenditures for these combined marketing activities would increase per capita total dairy demand by 0.078 percent. Thus, the total marketing effort by dairy farmers and milk processors has had a positive and statistically significant impact on dairy consumption.

Benefit-Cost Analysis of the Dairy Program

One way to measure whether the benefits of a program outweigh the cost is to compute a benefit-cost ratio (BCR). A BCR can be computed as the change in net revenue[8] due to generic dairy marketing divided by the cost of the checkoff program. A BCR was estimated for producers for the Dairy Program, but one could not be computed at this time for milk processors for the Fluid Program because data on packaged fluid milk wholesale prices, which are necessary in calculating processor net revenue, are proprietary and therefore not available.

BCRs[9] were calculated by simulating two scenarios: (1) a baseline scenario in which the combined marketing expenditure level was equal to actual marketing expenditures under the two programs and (2) a no-national-Dairy-Program scenario in which there was fluid milk processor sponsored marketing but dairy producer-sponsored marketing was reduced to 42 percent of actual levels to reflect the difference in assessments before and after the national program was enacted. A comparison of these scenarios provides a measure of the impact of the Dairy Program. The benefits of the Dairy Program were calculated as the change in dairy farmer net revenue (what economists refer to as "producer surplus") due to demand enhancement from all marketing activities under the Dairy Program (i.e., the difference in net revenue between scenarios 1 and 2). The demand enhancement reflects increases in quantity and price as a result of the marketing program. The costs of the Dairy Program were calculated as the difference in total assessment revenue before and after the national program was enacted.

The results show that the average BCR for the Dairy Program was 5.11 from 2000 through 2004. This means that each dollar invested in generic dairy marketing by dairy farmers during the period returned $5.11, on average, in net revenue to farmers. The level of the marketing BCR suggests that the marketing programs supported by dairy farmers have been a successful investment.

[8] "Net revenue" is defined as the aggregate gain in total revenue from price and product disappearance enhancements due to generic dairy marketing less the increase in supply costs for the additional milk marketed by dairy farmers.

[9] To measure market impacts, we estimated supply equations at the retail and farm levels to simulate supply response to any price increase due to a marketing-induced increase in demand. The results of these estimates are available from the authors upon request.

In another interpretation of the BCR, the generic dairy marketing expenditures resulting from the Dairy Program cost dairy producers an additional $147 million per year on average (i.e., the difference between $366 million annually under the baseline scenario and $219 million under the no-Dairy-Program scenario). This additional generic dairy marketing resulted in higher demand, prices, and net revenue for dairy producers nationwide. Based on the simulations conducted, we estimate that the average annual increase in producer surplus (reflecting changes in both revenues and costs) due to the additional generic marketing under the Dairy Program was $751.5 million. Dividing $751.5 million by the additional Dairy Program cost of $147 million results in the estimated benefit-cost ratio of 5.11.

To make allowance for the error inherent in any statistical estimation, a 90 percent confidence interval was calculated for the average BCR, providing a lower and upper limit for the average BCR. One can be "confident" that the true average BCR falls within those bounds 90 percent of the time. The estimated lower and upper bounds for the average BCR were 4.19 and 6.02, respectively. Hence, it is reasonable to conclude that the benefits of the Dairy Program's marketing activities have been considerably greater than the cost of the programs.

Questions often arise with respect to the accuracy of these BCR estimates. BCRs for commodity promotion programs are generally found to be large because marketing expenditures in relation to product value are small and, as such, only a small demand effect is needed to generate large positive returns. For example, the change in generic dairy marketing expenditures noted previously is 3.3 percent of the average annual value of farm milk marketings from 2000 through 2004 ($22.94 billion). The generic marketing activities conducted through the Dairy Program resulted in modest gains in the quantity of dairy products marketed and a positive effect on milk prices, resulting in large positive net revenue from the marketing investment.

Table 3–3. Description of Variables Used in Econometric Models[1]

Variable	Description	Units	Mean[2]
	Consumption Variables		
RFDPC	Quarterly retail fluid demand per capita	lbs MFE	13.81 (0.35)
RDDPC	Quarterly retail total dairy demand per capita	lbs MFE	39.40 (3.11)
	Price Indices		
RFPCPI	Consumer retail price index for fresh milk and cream deflated by consumer price index for all items (1982–84=1)	#	1.14 (0.09)
RDPCPI	Consumer retail price index for all dairy products deflated by consumer retail price index for all items (1982–84=1)	#	0.93 (0.03)
RBEVCPI	Consumer retail price index for non-alcoholic beverages (1982–84=1)	#	135.72 (4.09)
	Demographic and Income Variables		
INCPC	Quarterly per capita disposable income, deflated by the consumer retail price index for all items (2004=1)	$	7,743 (644.67)
AGE5	Percent of the population under age six	#	6.97 (0.22)
FAFH%	Food away from home expenditures as percent of total food expenditures	%	48.20 (0.70)
	Marketing Expenditures		
GMM	Quarterly generic fluid milk marketing expenditures deflated by media cost index (2004 $)	$mil	45.90 (14.08)
GMMD	Quarterly generic fluid milk marketing expenditures, Dairy Program, deflated by media cost index (2004 $)	$mil	22.84 (10.47)
GMMP	Quarterly generic fluid milk marketing expenditures, Fluid Milk Program, deflated by media cost index (2004 $)	$mil	23.06 (12.23)
GMCM	Quarterly generic fluid milk and cheese marketing expenditures, Dairy and Fluid Milk Program, deflated by media cost index (2004 $)	$mil	99.33 (25.73)
BWA	Quarterly per capita bottled-water advertising expenditures deflated by media cost index (2004 $)	$/person	0.0139 (0.01)

[1] Quarterly dummy variables are also included in the model to account for seasonality in demand.
[2] Computed over the period from 1995 to 2004. Standard deviation in parentheses.